

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

WINDBREAK/SHELTERBELT ESTABLISHMENT

(Feet)

CODE 380

DEFINITION

Linear plantings of single or multiple rows of trees or shrubs or sets of linear plantings.

PURPOSE

- To reduce soil erosion from wind.
- To protect plants from wind related damage.
- To alter the microenvironment for enhancing plant growth.
- To manage snow deposition.
- To provide shelter for structures, livestock, and recreational areas.
- To enhance wildlife habitat by providing travel corridors.
- To provide living noise screens.
- To provide living visual screens.
- To improve air quality by reducing and intercepting particulate matter
- To improve air quality by providing living barriers against airborne chemical drift and odor movement.
- To delineate property and field boundaries.
- To improve irrigation efficiency.
- To enhance aesthetics.
- To increase carbon storage in biomass and soils.

CONDITIONS WHERE PRACTICE APPLIES

On any areas where linear plantings of woody plants are desired and suited.

CRITERIA

General Criteria Applicable To All Purposes

The location, layout and density of the planting will accomplish the purpose and function intended within a 20-year period.

The maximum design height (H) for the windbreak or shelterbelt shall be the expected height of the tallest row of trees or shrubs at age 20 for the given site.

Species must be adapted to the soils, climate and site conditions.

Species shall be suited for the planned practice purpose(s).

Site preparation shall be sufficient for establishment and growth of selected species, not contribute to erosion, and be appropriate for the site.

Only viable, high quality, and adapted planting stock or seed will be used.

If possible choose native species over non-native species. If non-native species are used make sure species chosen are not invasive.

The planting shall be done at a time and manner to insure survival and growth of selected species.

Spacing between individual plants shall be based on the needed growing space for plant type and species, the accommodation of maintenance equipment, and the desired characteristics of the stem(s), branches and canopy as required for a specific purpose.

The windbreak will be oriented as close to perpendicular to the troublesome wind as possible.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

Avoid planting trees or shrubs where they will interfere with structures and above or below ground utilities.

Moisture conservation or supplemental watering shall be provided for plant establishment and growth where natural precipitation is too low for the selected species.

Comply with applicable federal, state and local laws and regulations during the installation, operation, and maintenance of this practice.

Additional Criteria to Reduce Wind Erosion and Protect Growing Plants

The interval between windbreaks shall be determined using current, approved, wind erosion technology. Interval widths shall not exceed that permitted by the soil loss tolerance (T), or other planned soil loss objective. Calculations shall account for the effects of other practices in the conservation management system.

For wind erosion control, temporary measures will be installed to supplement the windbreak until it is fully functional.

Sites, fields, and plants are protected within an area 10 times the design height (H) on the leeward side and two times the design height (H) on the windward side of the windbreak.

Additional Criteria to Manage Snow Deposition

The windbreak will be oriented as close to perpendicular to the snow-bearing wind as possible.

For snow distribution across a field, the windbreak density (during expected snow-producing months) shall not be less than 25 percent or greater than 50 percent. The interval between barriers will not exceed 20H.

For snow accumulation, the minimum barrier density, during expected snow-producing months, will be 50 percent.

Windbreaks will be located so that snow deposition will not pose a health or safety problem or obstruct human, livestock or vehicular traffic.

Where water erosion and/or runoff from melting snow is a hazard, it shall be controlled by supporting practices.

Additional Criteria to Provide Shelter for Structures, Livestock and Recreational Areas

For wind protection, the minimum barrier density will be 65 percent during the months of most troublesome wind and the area to be protected will fall within a leeward distance of 10H.

Drainage of snowmelt from the windbreak shall not flow across the livestock area.

Drainage of livestock waste from the livestock area shall not flow into the windbreak.

Additional Criteria for Noise Screens

Noise screens shall be at least 65 percent dense during all times of the year, as tall as, and as close to the noise source as practicable.

The length of the noise screen shall be twice as long as the distance from the noise source to the receiver.

For high-speed traffic noise, the barrier shall not be less than 65 feet wide. For moderate speed traffic noise, the barrier width shall not be less than 20 feet wide.

Species selected will be tolerant to noxious emissions, sand, gravel depositions or salt spray from traffic areas.

Additional Criteria for Visual Screens

Visual screens shall be located as close to the observer as possible with a density, height and width to sufficiently block the view between the area of concern and the sensitive area.

Additional Criteria for Improving Air Quality by Reducing Particulate Matter Generation

The windbreak interval shall be less than or equal to 10h depending on site conditions and related supporting conservation practices.

Windbreak density on the upwind site density shall be greater than 50% to reduce the air flow from source area.

Windbreak density adjacent to the particulate source shall be greater than 65% to intercept particulates.

Additional Criteria for Improving Air Quality by Reducing Odor Movement and/or Chemical Drift

Vegetation shall be maintained to control odor movement and chemical drift. Orientation of the shelterbelt shall be perpendicular to the predominant wind direction, and between the source area and the area sensitive to the source.

Locate shelterbelts upwind of the odor producing area to disrupt air flow around the odor producing area, increase turbulence in the boundary layer over the area, and increase dilution of contaminants in the air, thus reducing odor.

Locate shelterbelts downwind, between the odor source and the sensitive area, so that foliage can intercept odors. Windbreaks for this purpose should be extensive enough to account for wind direction changes at critical times.

Locate shelterbelts upwind of the chemical application area to reduce air movement and subsequent chemical drift.

Locate shelterbelts downwind of the chemically treated fields to intercept fumes, drift, and/or chemically treated soil. Species selections should be compatible with pesticides to be used. Maintain a 60% or greater density to insure adequate interception of drifting particles.

Select and maintain tree and shrub species with foliar and structural characteristics to optimize interception, adsorption and absorption of airborne chemicals or odors.

Additional Criteria for Increasing Carbon Storage in Biomass and Soils

Maximize width and length of the windbreak to fit the site.

For optimal carbon sequestration, select plants that have higher rates of sequestration in biomass and soils and are adapted to the site to assure strong health and vigor. Plant the appropriate stocking rate for the site.

When using trees and shrubs for greenhouse gas reductions, prediction of carbon sequestration rates shall be made using current and approved carbon sequestration modeling technology, [if available](#).

Additional Criteria for Providing or Enhancing Wildlife Habitat or Travel Corridors

Plant species selection shall benefit targeted wildlife species.

Design dimensions of the planting shall be adequate for targeted wildlife species.

[Linear planting of trees and shrubs primarily for wildlife should be done in accordance to Practice Standard 422 – Hedgerow Planting.](#)

Additional Criteria for Improving Irrigation Efficiency

For sprinkler irrigation systems, the windbreak shall be as tall as the sprinkler heads.

The barrier shall not interfere with the operation of the irrigation system.

CONSIDERATIONS

To enhance aesthetics use evergreen species or species with features such as showy flowers, brilliant fall foliage, or persistent colorful fruits.

Selection of plants for use in windbreaks should favor species or varieties tolerant to herbicides used in the area.

Plants that may be alternate hosts to undesirable pests should be avoided.

All plantings should complement natural features.

Tree or shrub rows should be oriented on or near the contour where water erosion is a concern. Where water erosion and/or runoff from melting snow is a hazard, it should be controlled by supporting practices.

Wildlife should be considered when selecting tree or shrub species. Species diversity, including use of native species, should be considered to avoid loss of function due to species-specific pests.

Visual screens shall be utilized to reduce neighbors' views of animal production and waste facilities, which may lead to reduced odor complaints associated with visual stimulus of olfactory senses.

Consideration should be given to adverse offsite effects.

Windbreaks for odor and chemical control increase in effectiveness as the amount of foliage available for intercept increases. Multiple row, wide plantings offer greater interception potential than do smaller plantings.

Plants established in cropping systems should have root systems that do not affect crop growth and/or spread from root sprouts.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

The following actions shall be carried out to insure that this practice functions as intended throughout its expected life. These actions

include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance).

Replacement of dead trees or shrubs will be continued until the barrier is functional.

Supplemental water will be provided as needed.

Thin or prune the barrier to maintain its function.

Inspect trees and shrubs periodically and protect them from adverse impacts including insects, diseases or competing vegetation. The trees or shrubs will also be protected from fire and damage from livestock and wildlife.

Periodic applications of nutrients may be needed to maintain plant vigor.